| Title of Document: | HANDLING MANUAL | Issue No. CHM-1-2741 | Rev. 0 |
|---|---|---|---|
| Customer: | GENERAL | Issue date: February 22, 2021 | |
| Title subject: | BMSC Connector | Revision date: | |

This handling manual describes points of usage, precautions, handling, etc. of BMSC connector.

C O N T E N T S

# C O N T E N T S

1. Part Name, Model Number and Parts Identification

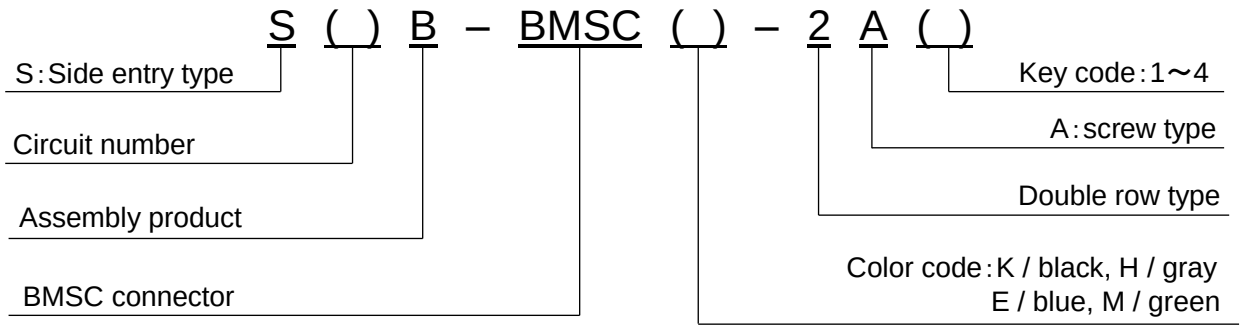
1-1 Part name and model No.

This BMSC connector consists of following each part as shown in Table-1 and Fig.-1.

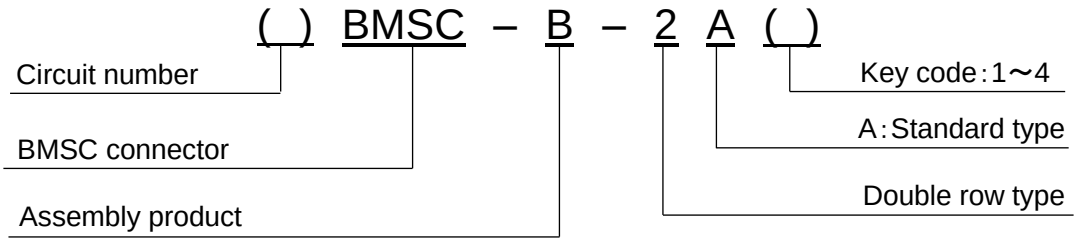
Table-1

| Part Name | JST Model Number |
|---|---|
| ①BMSC Male assembly | S( )B-BMSC( )-2A( ) |
| ②BMSC Female assembly | ( )BMSC-B-2A( ) |
| Female terminal | SNAC3-A021T-M0.64 |

① BMSC Male assembly

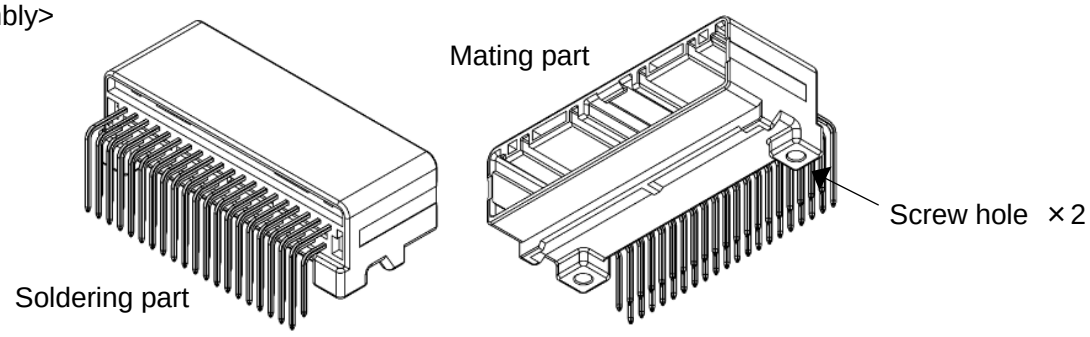



② BMSC Female assembly

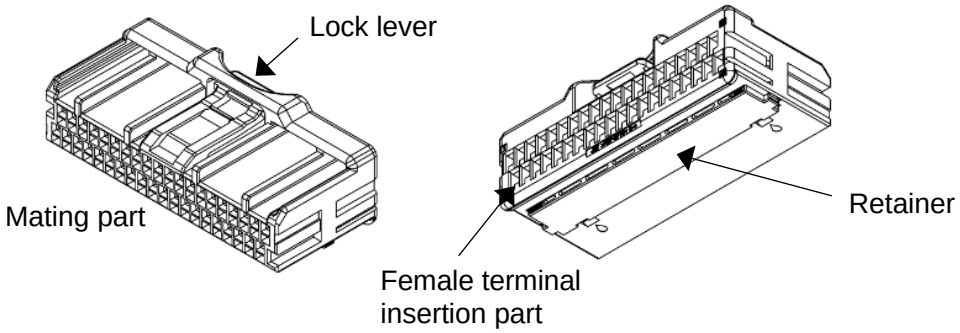


1-2 Parts identification

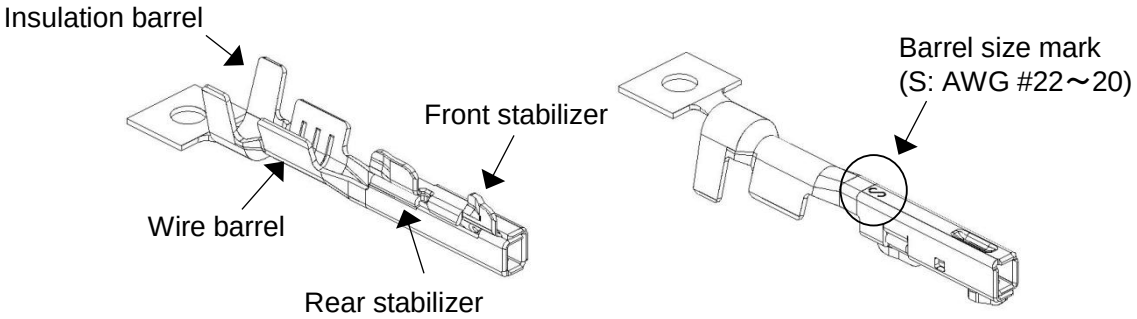
<Male assembly>




<Female assembly>




<Female terminal>




SNAC3-A021T-M0.64

Fig.-1 BMSC connector components

2. Inspection for Assembly and Terminal

It is recommended that inspection of each part be conducted by the following procedure using drawing as the acceptance inspection at customer.

2-1 Male assembly

| Check item | Description & method | Measuring equipment |
|---|---|---|
| Appearance | • No burr/flash, deformation, discoloration or pit | Visual inspection |
| | • No crack or chip | |
| | • No coming off or deformation of male pin | |
| Performance | • Inserting condition of male pin into male housing | |

2-2 Female assembly

| Check item | Description & method | Measuring equipment |
|---|---|---|
| Appearance | • No burr/flash, deformation, discoloration or pit | Visual inspection |
| | • No crack or chip | |
| Performance | • Mating check<br>Check that female assembly can be mated and unmated easily with male side, and check the “click” sound and retainer detection mechanism of half-inserted terminal operates properly. | Visual inspection<br>Finger |
| | • Inserting check of female terminal<br>Insert female terminal into each cavity under the condition that retainer floats approx. 1 mm (pre-lock position), and then, check that retainer can be inserted into female housing completely. | |

Note: When retainer comes down to lock position during transportation, etc. push it back to its pre-lock position by using precision driver of approx. 1.2 mm wide at the tip.

2-3 Female terminal

| Check item | Description & method | Measuring equipment |
|---|---|---|
| Appearance | • Appearance configuration | Visual |
| | • Plating | |
| | • Reel winding condition | |
| Dimension | • Width and height of wire barrel and wire insulation barrel | Micrometer |

3. Storage

Recommended storage condition: Temperature: 5 – 35 ˚C, Relative humidity 60 % or less
(Under packaging like the state of JST shipment)

Keep off direct sunlight, places exposing to such corrosive gas as industrial gas (generate from a stove and whatnot) and ammonia gas (generate from a toilet and whatnot) and dusty place.
Also, keep the storage room from condensation.

Note that the resin molding part may break due to transportation and handling, such as processing and mating, under dry or low temperature condition.
After unpacking, return the products in the original package to store.

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3-1 Male assembly

Male assembly is put into exclusive tray and shipped in order to prevent damage on pin of male assembly. Keep such case in proper carton box and store it safety until it is used.

3-2 Female assembly

Female assembly is put into a tray and packed into a carton box, and then shipped out.
Do not take it out from carton box until it is used, but keep the box in a safe place.

3-3 Female terminal

In order to keep female terminal clean and safe, they are wound on reel with intermediate paper.
As female terminal reel is packed into exclusive carton box for safety during transportation and storage, do not take it out from the box until crimping operation starts. (Fig.-2)

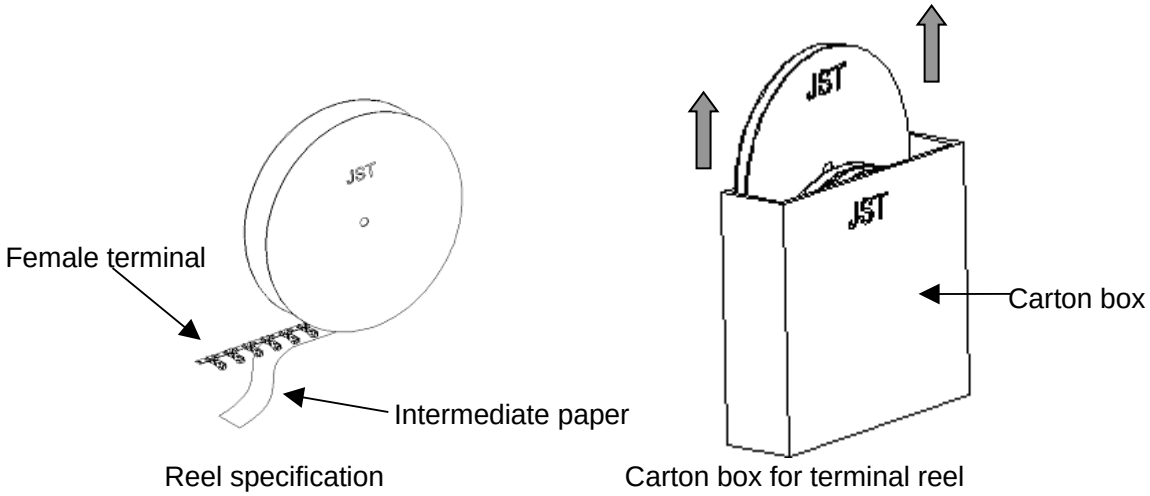



Fig.-2

3-4 Storage of the crimped contacts
Not leaving the crimped contact to stand in a place exposed to high humidity and direct sunshine, and not placing them directly on the ground, keep them in a clean storage room.
Never spray insecticide in storage area since such spray may rust on the contacts.

4. Applicable Wire

| Female terminal | Applicable wire |
|---|---|
| SNAC3-A021T-M0.64 | AVSS / CAVS 0.3 to 0.5mm$^2$<br>AVSSH 0.5 mm$^2$ (Note$_1$)<br>CIVUS 0.35 to 0.5 mm$^2$ |

Note$_1$: Wire conductor shall be annealed copper concentric stranded wire.
Note$_2$: Special wires other than above wires cannot be used in principle.
When using special wires, please contact JST.

5. Crimping Tool

| Part name | Barrel size | Model No. |
|---|---|---|
| Semi-automatic press | S | AP-K2( ) |
| Crimping applicator set<br>(Crimping applicator & Die set) | S | APLMK SNAC3-A021-064 |
| Crimping applicator | S | MKS-L |
| Die set | S | MK/SNAC3-A021-064 |

When crimping operation is conducted by using other than above die set, JST cannot guarantee the performance of connector.

6. Crimping Operation

Before crimping operation, be sure to check the combination of terminal, wire to be used and crimping die are correct. Check the below points for proper crimping operation.

6-1 Wire strip

When wire is striped, do not damage or cut off wire conductors. As wire strip length differs depending on type of wire, crimping method, etc. decide the best wire strip length considering processing condition. (Fig.-3)

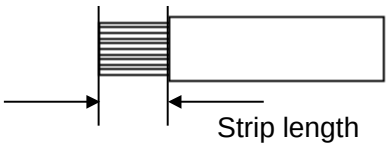



Fig.-3

Reference value of wire strip length: 4.2 mm

6-2 Crimping

Check the below points for correct crimping at beginning, middle and end of crimping operation.

6-2-1 Measurement of crimp height

According to wire to be used, adjust dials of applicator at wire conductor part and wire insulation part to a proper crimp height. (Fig.-4)

<u>Crimp height</u>

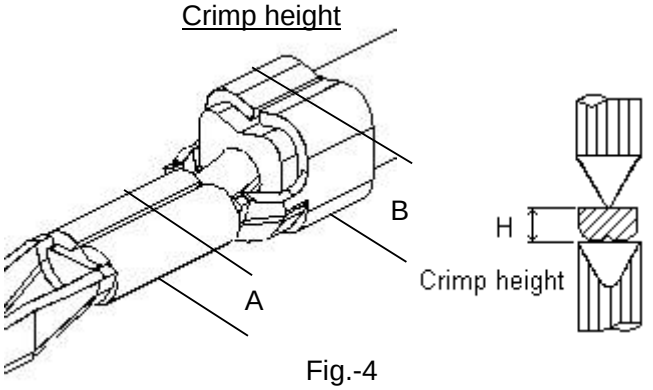



Fig.-4

A: Crimp height at wire barrel should be set to pre-determined dimensions.

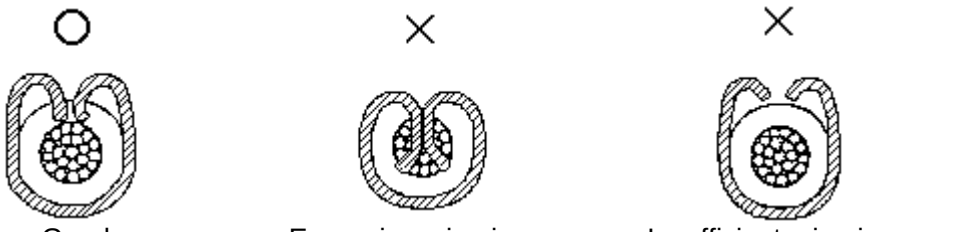
B: Adjust crimp height at wire insulation barrel as per finished outer diameter and kind of wire so that wire insulation does not come off terminal easily and is not crimped excessively.

H: Measure crimp height at the center of wire barrel using specified micrometer.

Crimping data

| Female terminal | Wire | Conductor crimp height | Insulation crimp height (Reference value) |
|---|---|---|---|
| SNAC3-A021T-M0.64 | AVSS 0.3 $mm^2$ | 1.00 ± 0.03 mm | (2.30 mm) |
| | AVSS 0.5 $mm^2$ | 1.13 ± 0.03 mm | (2.35 mm) |
| | CAVS 0.5 $mm^2$ | 1.13 ± 0.03 mm | (2.35 mm) |
| | AVSSH 0.5 $mm^2$ | 1.13 ±0.03 mm | (2.30 mm) |
| | CIVUS 0.35 $mm^2$ | 1.00±0.03 mm | (1.80 mm) |
| | CIVUS 0.5 $mm^2$ | 1.13±0.03 mm | (2.00 mm) |

6-2-2 Crimping condition of wire insulation barrel



Good

Excessive crimping
(pressed excessively)
Barrel bites wire too much and may damage wire conductors.

Insufficient crimping
(pressed weak)
When tension is applied to wire, wire insulation easily comes off terminal.

Fig.-5

6-2-3Checks of crimping condition at wire insulation barrel

Cut only wire insulation barrel, remove wire insulation and check if wire conductors are not damaged.

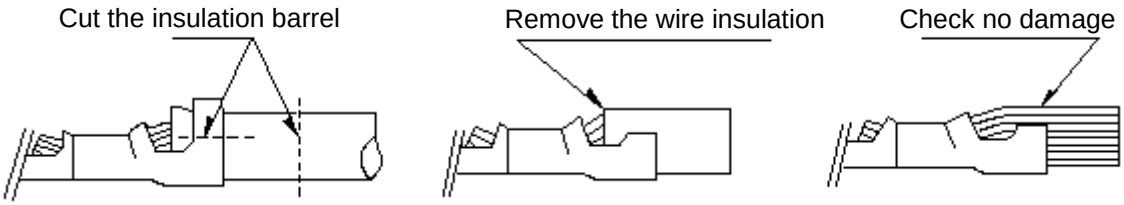



Fig.-6

6-2-4Tensile strength at crimped part

After adjusting crimp height, check tensile strength using the trial samples.
In case tensile strength greatly differs from normal tensile strength (actual value), check if there is a defect. Tensile strength may be different even in the same wire size due to different strength of wire itself.

Table of tensile strength at crimped part of female terminal

| Wire size | Requirement | Actual value (Ref. value) |
|---|---|---|
| AVSS 0.3 $mm^2$ | 50N min. | 72.3N ~ 82.0N |
| AVSS 0.5 $mm^2$ | 90N min. | 125.3N ~ 128.0N |
| CAVS 0.5 $mm^2$ | 90N min. | 123.9N ~ 137.1N |
| AVSSH 0.5 $mm^2$ | 90N min. | 127.2N ~ 131.7N |
| CIVUS 0.35 $mm^2$ | 50N min. | 68.5N ~ 79.3N |
| CIVUS 0.5 $mm^2$ | 90N min. | 115.9N ~ 116.8N |

Note$_3$: Actual value of tensile strength is for samples with crimped only conductor part.

6-2-5 Crimping appearance

Check crimping appearance visually for correct crimping with equipment such as a loupe.

Part name of crimped terminal

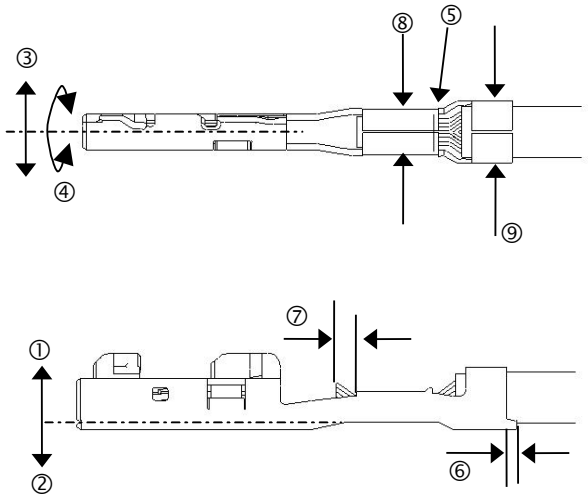
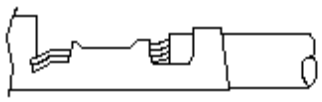


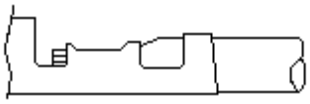

Fig.-7

| | Item | Reference value |
|---|---|---|
| ① | Bending up | 3° max. |
| ② | Bending down | 3° max. |
| ③ | Twisting | ±4° max. |
| ④ | Rolling | ±10° max. |
| ⑤ | Bell-mouth (Rear side) | 0.4 mm max. |
| ⑥ | Cut-off length | 0.4 mm max. |
| ⑦ | Wire conductor protruding length | approx. 0.5 ~ 1 mm |
| ⑧ | Crimp width at conductor part | approx. 1.57 mm |
| ⑨ | Crimp width at insulation part | 1.75 mm max. |

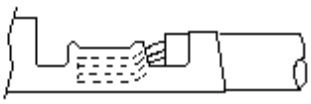
6-2-6 Examples of defective crimping



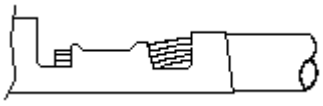
Wire conductor protruding length is long.



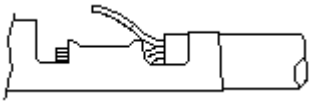
Wire barrel bites wire insulation.



Wire conductor protruding length is short.

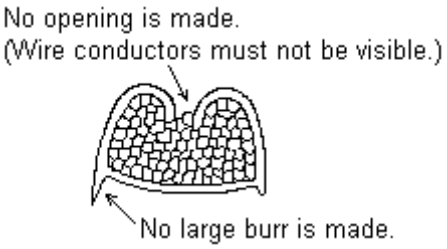


Wire insulation protruding length is short.



Wire conductors come off.

Fig.-8




6-2-7 Bending up, bending down, twisting and rolling (Fig.-9)

Bending up (Bending down) Twisting Rolling

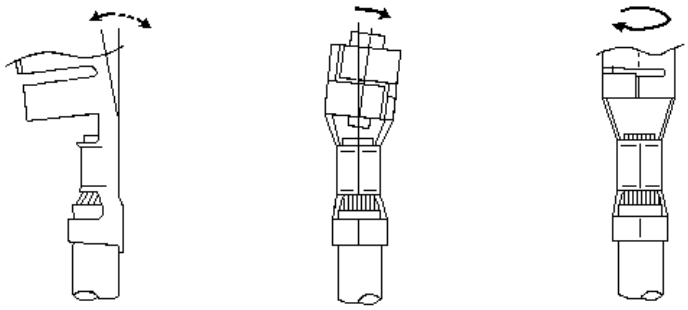


Fig.-9

Note that bending up, bending down, twisting and rolling may deteriorate the contact insertion in the housing and the contact retention force and cause poor contact.

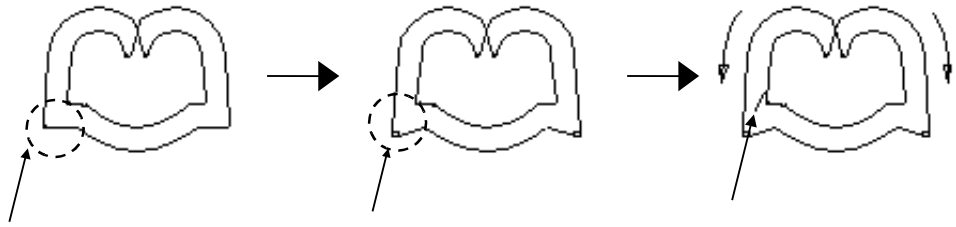
6-2-8 Abrasion of crimping die

Regarding crack caused by abrasion of crimping die, check appearance of crimping part of terminal and replace die with a new one occasionally in order to prevent discontinuity.

- Reference timing of replacement of crimping die
  ① When excessive roughness of crimped terminal surface is appeared. (Gloss of terminal surface is disappeared.)
  ② When opening of seam of crimped part is appeared. (Fig.-10)

Note: In the case that crimping is conducted beyond the reference timing, crack may appear on terminal as below.

- Mechanism of occurrence of crack (Cross section at wire conductor part)



Flat part of terminal is visible.

Flat part is reduced due to wearing out of crimper anvil.

Shear stress shown by the arrow is applied to the edge of inside of terminal, so that crack occurs.

Fig.-10

6-3 Precautions for storage and handling of crimped terminal

As crimped terminal before inserting into housing is subject to deformation by external forces, pay careful attention to storage and handling as below points.

① The number of crimped female terminals for one bundle should be 100 pcs. max. Protect terminals by wrapping with paper, etc. in order to prevent from deformation and adhesion of foreign matter, and keep them in an adequate box.

② Do not stack too much quantity of crimped terminals nor place anything on them, since weight of themselves may cause deformation of terminal and troubles such as defective contacting.

7. Harness Assembly Operation

7-1 Inserting female terminal into housing

① Check that retainer is in pre-lock position. (Fig.-11)

Note: In the case that retainer is in the lock position, female terminal cannot be inserted into housing. Put it back to the pre-lock position by using precision driver of approx. 1.2 mm wide at the tip. (Refer to item 7-3)

② Check that direction of female terminal is proper. (Fig.-11)

③ Hold wire part and insert female terminal in a straight line to hook lance securely until you hear it click. (Fig.-12)

Insert female terminal into each cavity of housing following the above procedures.

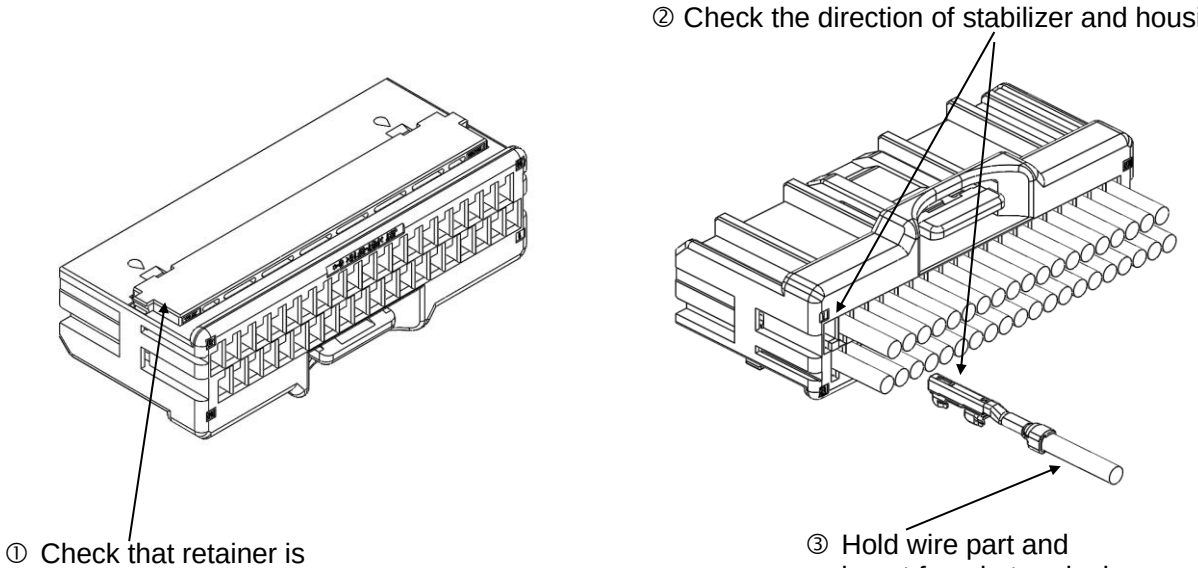



Fig.-11

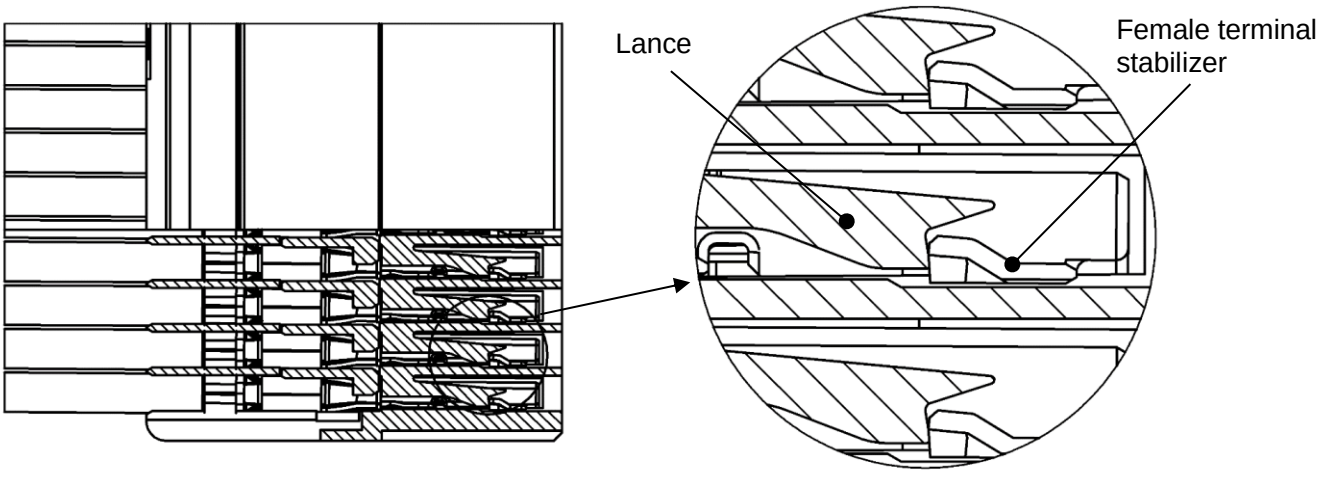



Fig.-12

7-2 Locking retainer (Change position of retainer: from pre-lock position to lock position)

① Press retainer at both sides simultaneously until bottom of retainer becomes same level as that of housing. (Fig.-13)

② When retainer is properly locked, you hear it click. After locking retainer, check that surface of retainer is on the same level as that of housing. (Fig.-13)

Note: Even when only one female terminal is half-inserted, retainer cannot be locked due to the detection mechanism of half-inserted terminal. At this time, not press retainer forcibly but check again that female terminal is properly inserted into housing, and press retainer to lock position.

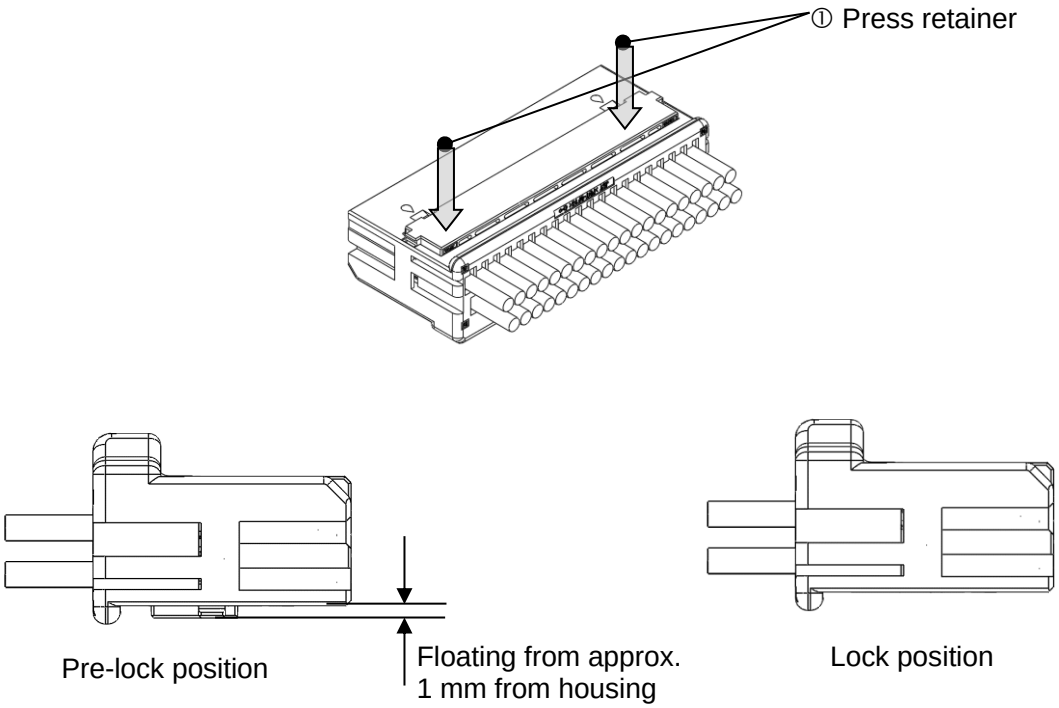



Fig.-13

7-3 Releasing retainer (Change position of retainer: from lock position to pre-lock position)

① Use precision driver of approx. 1.2 mm wide at the tip when releasing retainer from lock position to pre-lock position. (Fig.-14)

② Insert precision driver into the place of the circled area as shown in Fig.-14, and raise retainer due to leverage until it snaps out of position. (Fig.-14)

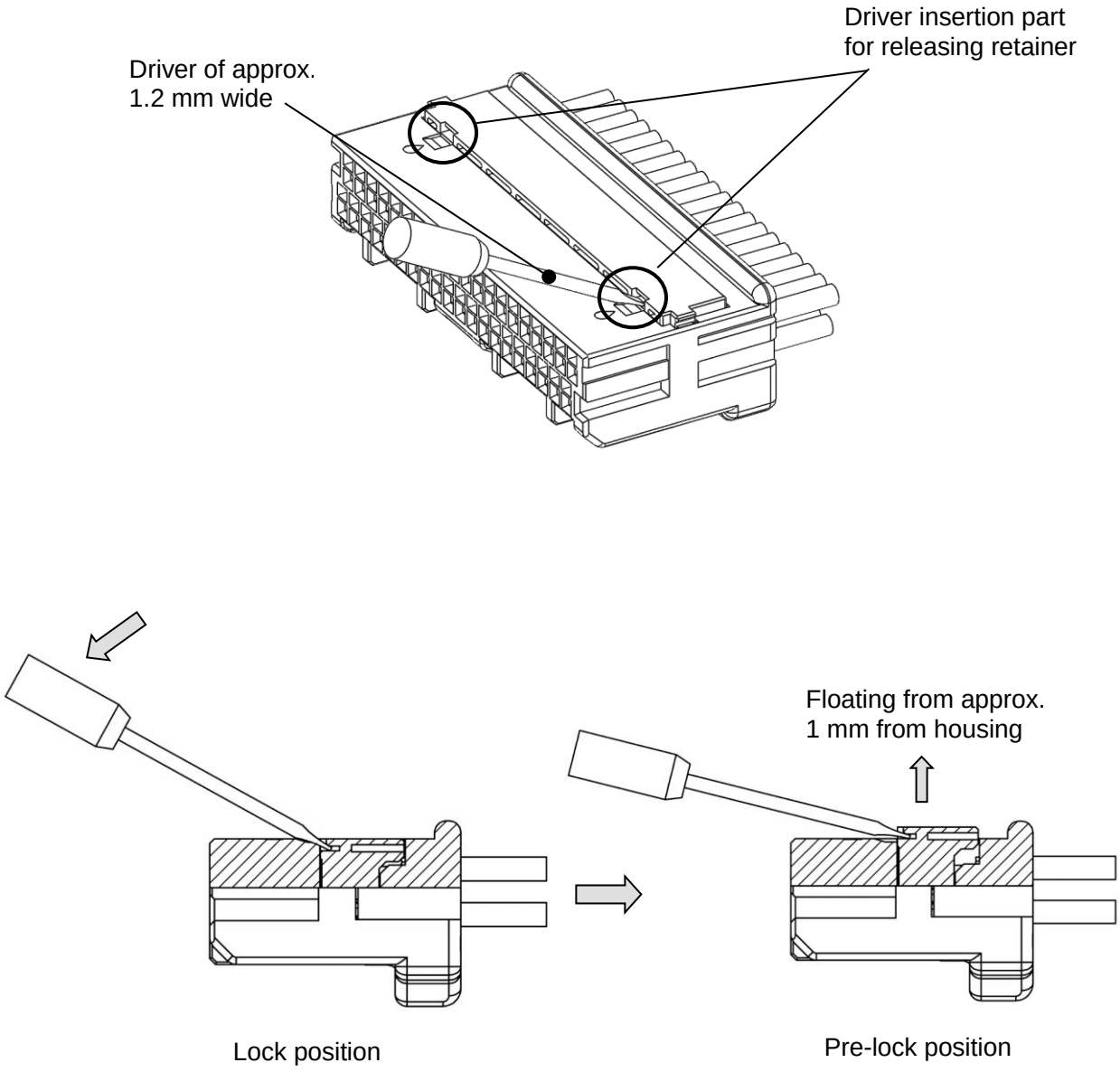



Fig.-14

7-4 Extracting female terminal from housing

7-4-1 Female terminal

①Check that retainer has been released to the pre-lock position. (Fig.-15)

Note: Unless retainer is released to pre-lock position, female terminal cannot be extracted from housing.

② When releasing the lock of housing lance, insert precision flat blade screwdriver of approx.0.8 mm wide at the tip into the lower of lance. (Fig.-16)

③ Then, release the lock of housing lance and female terminal in the direction of the arrow, and extract female terminal from housing carefully. (Fig.-16)

Note: Carefully conduct extracting operation so as not to apply scratch or damage on housing lance and female terminal.
Do not deflect unduly housing lance in extracting because the lance may be damaged.

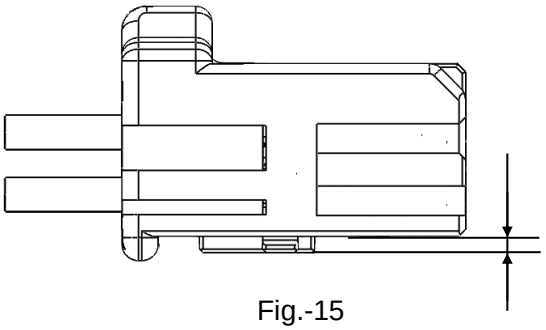



Fig.-15

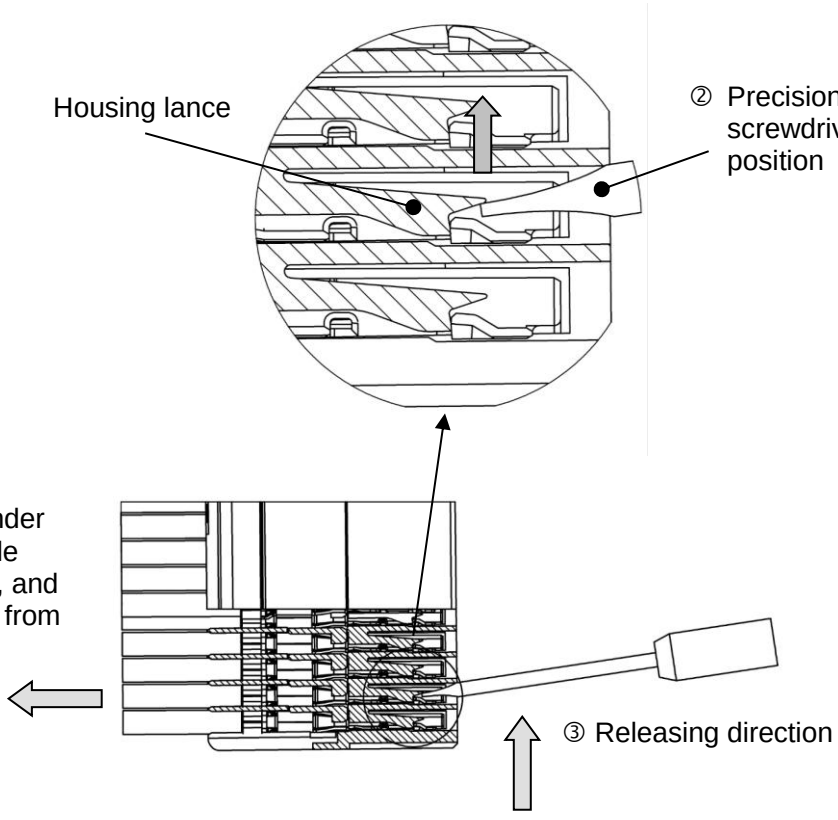



Fig.-16

7-5 Control points of harness

7-5-1 Handling
Do not apply the abnormal load or shock to connector and wire.

7-5-2 Binding, taping and bending of wire (Reference)
Bind wire at the position where is more than 25 mm away from connector end so as not to apply the abnormal load to wire.
Bend wire at the taping part. (Fig.-17)

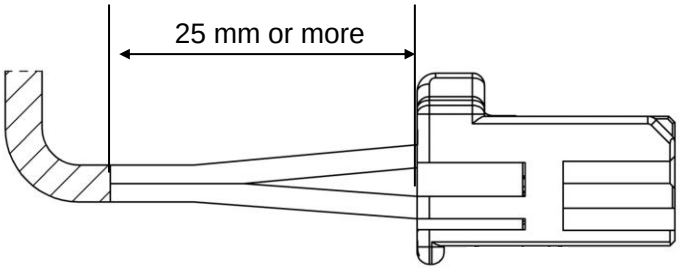



Fig.-17

7-5-3 Electrical continuity check

① Use the male assembly applicable to the connector for inspection.
Do not remove the housing wall of the male assembly.
If removed, the contact may be pried easily during the inspection, possibly leading to poor contact.

② Use the male assembly free from deformation, damage and stains.
If found, replace it with a new one. The periodical replacement of the male assembly should be conducted as well.

③ Mate and unmate the connector with care, holding the housing without prying.
When the inspection board is used, design it considering that the mating and unmating operation is not difficult.

④ Do not insert checker probe, etc. separately into female terminal inside.

8. Mounting Male Assembly on PC Board

① Do not apply deformation or damage on male pin of male assembly.

② When mounting male assembly on PC board, be sure to check that the direction of connector (male pin and screw hole) and PC board is proper. (Fig.-18)

③ Using tapping screw with 3 mm in diameter and 6 mm in length is recommended. (Fig.-19)
Recommended setting screw tightening torque: 0.4±0.05N・m

④ Flux: Use rosin type flux. As inorganic flux may corrode the header housing, do not use it.

⑤ Solder male assembly on PC board. (Fig.-20)
Do flow soldering at the temperature range of 245°C ~ 260°C within 5 seconds.
Pay careful attention to the screw not to apply high temperature in mounting, because the screw hole may float.

② Check the direction of connector and PC board.

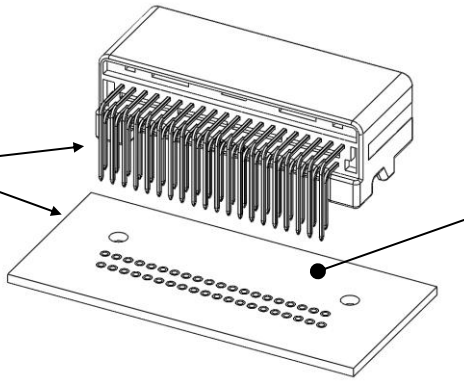
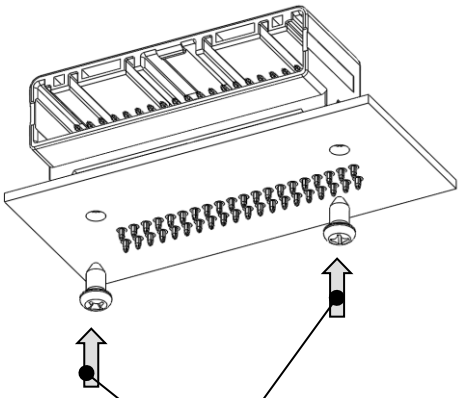
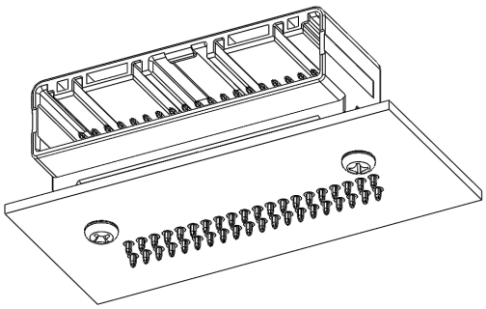



Fig.-18

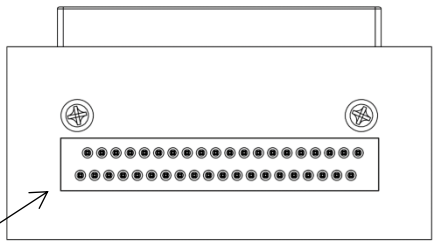


③ Screwed
Recommended screw tightening torque: 0.4±0.05[N・m]

Fig.-19



⑤ Solder male assembly on PC board.



Recommended flow area (solder part)

Fig.-20

⑥ Soldering by hand and soldering repair

Example of defective soldering

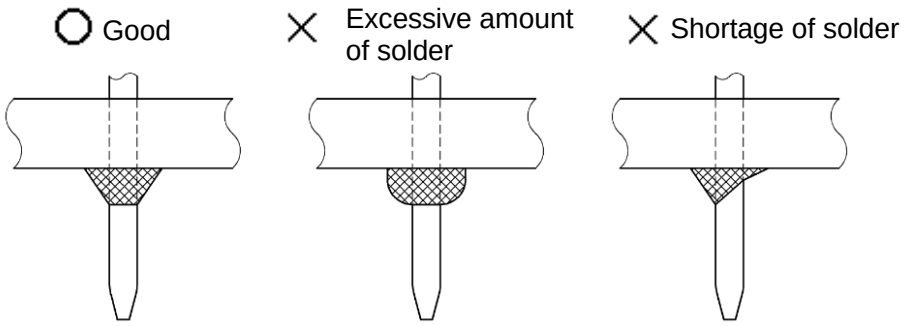



Fig.-21

When soldering or soldering repair for bridge is conducted with a soldering iron, note the following points, because the header housing may deteriorate due to heating.

| |
|---|
| Soldering iron: Use a soldering iron with small heat capacity (40W max.).<br>Soldering time: Do soldering quickly within 3 seconds.<br>Soldering method: Do not apply external force by such an operation as pressing the header post with the tip of the soldering iron during soldering. |

⑦ Cleaning operation

In normal flux cleaning, the cleaning solvent does not affect the header of the BMSC connector.
However, when polluted cleaning solvent by flux is left on the header, poor contact and other defects may be caused.

9. Mating and Unmating Connector

9-1 Mating connector

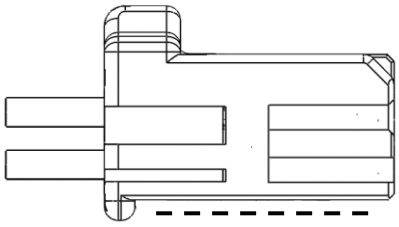
① Be sure to check that retainer is in the lock position before mating connector. (Fig.-22)

In the case that retainer is not in the lock position, terminal may have possibility of half-inserted condition. Be sure to check the insertion condition. (Refer to item 7-1 and 7-2)

② Before mating connector, check that male pin is not deformed or connector is free from adhesion of foreign matter.

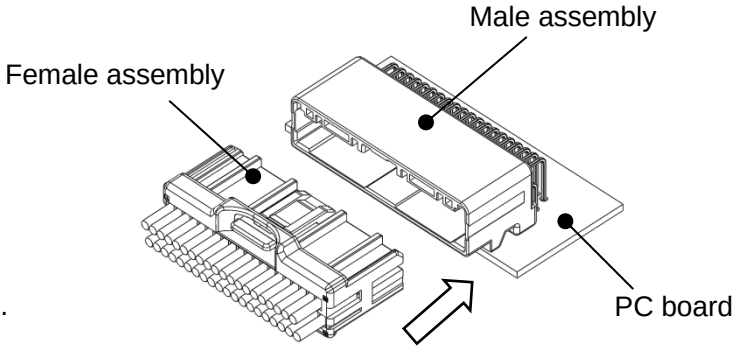
③ Check the mating direction of female assembly, and insert it into male assembly. In mating, it is not necessary to push housing lock. (Fig.-23)

④ Conduct mating operation until you hear the click. (Fig.-24)



① Lock position until you hear it click.
Check that female housing
becomes same level as retainer.

Fig.-22




③④ Insert female assembly into male assemble until you hear it click.

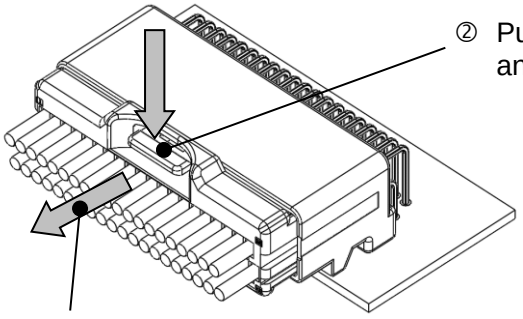
Fig.-23

9-2 Unmating connector

① When unmating connector, unlock housing lock without fail.

② Push the lock lever of female housing with thumb, and unlock housing lock.

③ Unmate female assembly from male assembly with lock lever pressed down. (Fig.-24)



② Push lock lever with thumb, and unlock housing lock.

③ Unmate female assem
assembly with lock lever pressed down.

Fig.-24